

Evidence-Base: Introduction / Team Structure

Teamwork has been studied extensively over the past 20 years. Research suggests teamwork is defined by a set of interrelated knowledge, skills, and abilities (KSAs) that facilitate coordinated, adaptive performance, supporting one's teammates, objectives, and mission.¹⁻⁴ Teamwork differs from taskwork (i.e., operational skills), yet both are required for teams to be effective in complex environments.⁵ However, knowledge and skill at the task are not enough. Teamwork depends upon team members' ability to:

- Anticipate needs of others
- Adjust to each other's actions and the changing environment
- Have a shared understanding of how a procedure or plan of care should happen

Key organizations involved in the education of physicians have recognized the importance of developing team-related knowledge and skills during medical education. For example, the Accreditation Council for Graduate Medical Education (ACGME) has identified six core competencies of graduate medical education (GME). These include patient care, medical knowledge, practice-based learning and improvement, interpersonal and communication skills, professionalism, and systems-based practice (www.acgme.org). Competency in interpersonal and communication skills requires residents to "demonstrate interpersonal and communication skills that result in effective information exchange and teaming with patients...and professional associates." Residents are expected to "work effectively with others as a member or leader of a health care team or other professional group." Residency review committees have begun to translate these six competencies into specific practice-based sub-competencies that can be trained and assessed in residency programs. The goal of the ACGME is to move resident training to a competency model where the focus is on educational and clinical outcomes, so that programs can be distinguished by strengths and weaknesses in each of these six areas.⁶

Similarly, the Association of American Medical Colleges (AAMC) recently funded a "critical incident" analysis to investigate the behaviors that result in successful and unsuccessful performance during medical school and residency. Over 1200 critical incidents were collected from medical students, residents, and medical school faculty from different regions of the United States. Independent sorting of these incidents by trained researchers resulted in eight dimensions of medical school performance and seven performance dimensions for residency. A review of these dimensions and their definitions revealed the importance of a number of teamwork-related competencies, including interpersonal skills and professionalism, interaction with patients and family, fostering a team environment, and mentoring/educating other students. Researchers concluded that the core competencies for success as a physician become important early and are important throughout the course of a physician's career.⁷

Finally, researchers have begun to identify skills that define team performance in health care. Specific team KSAs have been extracted from research on aviation teams based on the argument that medicine and aviation share a number of similarities including: the need for effective decision-making despite incomplete or conflicting information; the demand for coordination among professionals with varied skills and ranks; and the possibility of poor team performance leading to serious consequences or death. An analysis of several years of closed-claim files from eight hospitals supports this argument. Each file was classified using a teamwork failure checklist to identify trends. The results identified approximately 8.8 teamwork failures (related to such skills as communication, situational awareness, and assertiveness) per closed case.⁸⁻¹⁰

While there has been significant progress in defining team requirements in healthcare, the profession is in the early stages of fully leveraging the 20-plus years of research that has been conducted on teams and team performance.¹ This body of research has yielded a significant evidence-base for a set of core knowledge, skill, and attitude competencies that Salas and colleagues contend apply to almost all

teams.¹¹ The critical aspects of teamwork include: team leadership, mutual performance monitoring (i.e., situation monitoring), back-up behavior (i.e., mutual support), and communication. These core skills lead to important team outcomes like enabling the team to be adaptable to changing situations, compatible shared mental models among team members, and a stronger orientation toward teamwork. The table below presents each competency, definition, behavioral examples, and supporting references.

Team KSA competencies and outcomes

Teamwork	Definition	Behavioral Examples	Selected Citation
Team Leadership	Ability to direct and coordinate the activities of other team members, assess team performance, assign tasks, develop team KSAs, motivate team members, plan and organize, and establish a positive atmosphere	<ul style="list-style-type: none"> Facilitate team problem solving Provide performance expectations and acceptable interaction patterns Synchronize and combine individual team member contributions Seek and evaluate information that impacts team functioning Clarify team member roles Engage in preparatory meetings and feedback sessions with the team 	Cannon-Bowers, et al., 1995 ² ; Salas, et al., in press ¹² ; Barach et al, 2004 ¹³
Mutual Performance Monitoring (aka., Situation Monitoring)	The ability to develop common understandings of the team environment and apply appropriate task strategies in order to accurately monitor teammate performance	<ul style="list-style-type: none"> Identifying mistakes and lapses in other team members actions Providing feedback regarding team member actions in order to facilitate self-correction 	McIntyre & Salas, 1995 ¹⁴
Back-up Behavior (aka., Mutual Support)	<p>Ability to anticipate other team member's needs through accurate knowledge about their responsibilities.</p> <p>The ability to shift workload among members to achieve balance during high periods of workload or pressure</p>	<ul style="list-style-type: none"> Recognition by potential back-up providers that there is a workload distribution problem involving their team Shifting of work responsibilities to under-utilized team members Completion of the whole task or parts of tasks by other team members 	McIntyre & Salas, 1995 ¹⁴ ; Porter, et al., 2003 ¹⁵
Adaptability	Ability to adjust strategies based on information gathered from the environment through the use of compensatory behavior and reallocation of intra-team resources. Altering a course of action or team repertoire in response to changing conditions (internal or external)	<ul style="list-style-type: none"> Identify cues that a change has occurred, assign meaning to that change, and develop a new plan to deal with the changes Identify opportunities for improvement and innovation for habitual or routine practices Remain vigilant to changes in the internal and external environment of the team 	Cannon-Bowers, et al., 1995 ² ; Kozlowski, et al., 1999 ¹⁶ ; Klein & Pierce, 2001 ¹⁷
Shared Mental Models	An organizing knowledge structure of the relationships between the task the team is engaged in and how the team members will interact	<ul style="list-style-type: none"> Anticipating and predicting each other's needs Identify changes in the team, task, or teammates and implicitly adjusting strategies as needed 	Cannon-Bowers, et al., 1995 ² ; Klimoski & Mohammed, 1994 ¹⁸ ; Mathieu et al., 2000 ¹⁹ ; Stout, et al., 1996 ²⁰
Communication	The exchange of information between a sender and a receiver, irrespective of the medium	<ul style="list-style-type: none"> Following up with team members to ensure message was received Acknowledging that a message was received Clarifying with the sender of the message that the message received is the same as the intended message sent 	McIntyre & Salas, 1995 ¹⁴

To provide a first-look at the generalizability of the core principles of teamwork to health care, a list of critical team KSA competencies was presented to a panel of leading experts from healthcare, aviation, and human factors. This panel was sponsored by the Department of Defense and convened by the American Institutes for Research (AIR) during January 2003. There was general consensus among experts that the competencies presented in the table on the previous page are important for effective teamwork in healthcare. Experts viewed this list as an excellent starting point for structuring team training and defining assessment requirements.

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